increased use of thiazide diuretics in this group, and evidence supports the use of both ACE inhibitors and diuretics across a wide range of blood pressures [18].

In conclusion, despite equity of access to stroke services, we have identified evidence consistent with an influence of gender upon prescribing in stroke survivors. Further work is now required to clarify the underlying reasons for the observed disparity and to assess the degree to which this pattern is repeated elsewhere.

Key points

- Prescribing patterns after stroke may be influenced by gender.

Conflicts of interest

The authors have no relevant disclosures or conflicts of interest.

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Relationship between instrumental activities of daily living and blood glucose control in elderly subjects with type 2 diabetes

SIR—it is well established that diabetes is an independent risk factor for eye, kidney and neurological diseases as well as for cardiovascular morbidity and mortality [1–3]. Recent evidence from several epidemiological studies suggests that diabetes is also a risk factor for functional limitations and disability in aged subjects [4–10]. In fact, diabetic subjects 65 years and older have been suggested to have a greater number of limitations for activities of daily living (ADL) and instrumental activities of daily living (IADL) in strict relation with disease duration and age [4–6, 8]. Such a disability may lead to an increased likelihood for hospitalisation,

institutionalisation, and loss of economic self-sufficiency [6], thereby being an important diabetes-related health outcome in older adults [9]. However, it is not clear whether disability is a consequence of hyperglycaemia or of chronic complications of the disease [11] and therefore whether and to what extent the correction of hyperglycaemia may improve disability in diabetes [12].

With the aim of investigating the correlation between IADL disability and blood glucose control we studied cross-sectionally 43 patients (18 males and 25 females, mean ± SEM age 79.6 ± 1.0 years, range 68–92) with clinical and biochemical diagnosis of type 2 diabetes. These subjects were consecutively recruited among a cohort of 55 diabetic patients who attended the Geriatric and Gerontology Clinic of the University of Brescia in the period January–June 2005. Thirty-nine elderly subjects without clinical, biochemical and personal history of diabetes, attending the same clinic were selected on the basis of comparable sex and age with the diabetic patients and acted as a control group (Table 1). Exclusion criteria for diabetic and control subjects were: (i) age less than 65 years; (ii) dementia as defined by Mini-Mental State Examination score ≤22 [13, 14]; (iii) chronic disabling osteo-articular disease as defined by an Health Assessment Questionnaire score ≥8 [15]; (iv) any abnormalities at ophthalmologic examination; (v) reported episodes of hypoglycaemia in the 6 months before the evaluation.

The diagnosis of diabetes was ascertained using a combination of medical history, drug use and fasting plasma glucose (FPG). Patients were characterised as having diabetes if FPG level was ≥126 mg/dl or if they were on anti-diabetic medication. At the study entry, 22 patients were on oral hypoglycaemic drugs, 9 on insulin and 12 on hypocaloric diet alone. The median duration of diabetes was 5 years (range 1–38). The control of diabetes was assessed by serum glycosilated haemoglobin (HbA_{1c}). Twenty-five patients (58.1%) reached the glycaemic target (HbA_{1c} <7.0%) recommended by the American Diabetes Association [16], whereas in 18 patients (41.9%) diabetes was not controlled. Ten control subjects (25.6%) had impaired fasting glucose (IFG) as defined by FPG level between 100 and 125 mg/dl [16].

The coexistence of hypertension and peripheral artery disease (PAD) was assessed by historical, clinical and instrumental approaches. Patients were defined as hypertensive if blood pressure levels (average of two seated measurements at rest) were above 130/80 mmHg in diabetic subjects and 140/90 mmHg in non-diabetic subjects or if under active anti-hypertensive treatment [17, 18]. Thirty-four patients with diabetes (81%) and 27 control subjects (69.2%) had hypertension. Moreover, 14 patients (34.1%) and 10 control subjects (25.6%) were diagnosed with PAD on the basis of clinical evaluation [19]. Moreover, the clinical history of stroke was recorded in the two study groups. IADL was assessed through a questionnaire administered to the patients providing self reported information on performance and capacity for five areas: house work, management of finances, taking medications, phone use and travel (places out of walking distance) [20, 21]. Lower overall IADL score indicated better functioning. For each item a score of 0 identified no deficit, whereas 1 indicated that the subject either required assistance or was completely unable to perform the specific task. Disability was defined with a total IADL score above 2 [20, 21].

Informed consent for the study was obtained from the patients and control subjects.

All data were expressed as median and range. Un-paired data were compared using the Mann–Whitney test. Multiple comparisons were evaluated with Kruskall Wallis test, followed by Mann–Whitney test, as appropriate. Frequencies were compared using chi-square test with Fisher correction, when appropriate. Logistic regression analysis was performed for testing the association between IADL disability and multiple covariates. Statistical significance was assumed when *P*-values were equal to or less than 0.05.

In the whole group of diabetic patients, the median IADL score was not significantly different from that calculated in the control subjects (3, range: 0–5 versus 2, range: 0–5; $P = 0.07$). However, diabetic patients with poorly controlled diabetes had IADL disability score significantly higher than diabetic patients with well-controlled disease and normal subjects, with no differences in disability among the last two categories (Table 1).

Multivariate logistic regression analysis showed that overall IADL score was significantly correlated only with HbA_{1c} (OR 4.4, 95% CI 1.4–13.8; $P = 0.009$) in diabetic patients and with FPG (OR 1.1, 95% CI 1.0–1.2; $P = 0.03$) in the control population. The prevalence of IADL disability was significantly higher in control subjects with IFG versus normal FPG (80% versus 27.6%, chi-square: 8.4; $P = 0.004$).

Table 1. Demographical and clinical features expressed as median and ranges (in parenthesis) of aged patients with type 2 diabetes, subdivided according to the control of disease, and aged control subjects at the study entry

		Diabetic patients	
	Control Subjects	Well controlled disease	Poorly controlled disease
Cases	39	25	18
Age (years)	78 (67–94)	80 (70–91)	78 (68–92)
Sex (F/M)	22/17	13/12	12/6
FPG (mg/dl)	89 (75–112)	124.5 (70–152)	157.0 (110–361)*
HbA_{1c}	—	6.1 (5.0–6.9)	7.7 (7.1–11.0)**
IADL score	2 (0–5)	2 (0–5)	4 (1–5)*
Disability rate (%)	41.0	41.7	77.8*

* $P = 0.002$ poorly controlled disease versus well-controlled disease and control subjects;

** $P<0.05$ poorly controlled disease versus well-controlled disease. FPG, fasting plasma glucose; HbA_{1c}, serum glycosilated haemoglobin; IADL, instrumental activities of daily living.

Multivariate logistic regression analysis in the combined population (diabetic patients and controls) showed that IADL disability was slightly but significantly correlated with FPG (OR 1.02, 95% CI 1–1.04; $P = 0.03$) independently of the effects of age, sex, history of stroke and presence of hypertension and PAD.

This cross-sectional study suggests that aged patients with type 2 diabetes have an increased risk of IADL disability in close relationship with the poor metabolic control of disease. The IADL scale is a validated method to identify patients with disability, although with potential drawbacks deriving from limited sensitivity and variability due to cultural and social differences possibly influencing the subjective self-evaluation and comprehension of questionnaire [22]. However, there is convincing evidence that the IADL score may be a simple and effective tool for identifying individuals at risk of frailty among elderly persons living at home and in apparent good health [23], and the IADL disability in general is associated with increased mortality [24]. Over the recent years, a number of studies have clearly demonstrated that type 2 diabetes is associated with an impairment of ability to maintain daily life independence in aged subjects [4–6, 8]. In fact, patients with diabetes mellitus are more likely to report disability, have more days of restricted activity and more physical function limitations [4–6, 8]. An open issue, however, is whether the disability occurring in diabetes depends on the disease itself or on its chronic complications, which were also found to be associated with cognitive impairment and disability [11, 25, 26].

In our study, high prevalence of IADL disability was found in patients with uncontrolled diabetes without cognitive impairment regardless of the presence of chronic vascular disease, whereas the patients whose diabetes was controlled by the treatment showed comparable disability with that found in non-diabetic subjects of similar age. It can be hypothesised that the presence of disability may be a marker for a group of diabetic patients who have difficulties in managing their disease. However, the observation of a high prevalence of disability in control subjects with IFG suggests that IADL disability may be a consequence rather than a cause of uncontrolled hyperglycaemia. In fact, even mild increases in plasma glucose levels may be sufficient to determine disability in aged subjects and IADL may be suggested to be impaired early during the natural history of type 2 diabetes.

The close relationship between HbA_{1c} and IADL score in our patients and the difference between controlled and uncontrolled diabetes would suggest that disability in diabetes may be a changeable phenomenon sustained by functional rather than structural abnormalities. Our study does not allow to clarify the mechanisms responsible for the hyperglycaemia-induced disability. However, it can be hypothesised that insulin resistance underlying type 2 diabetes may play a role in the development of cognitive as well as physical impairment [27, 28]. This hypothesis is strengthened by the observation that very mild hyperglycaemia in the likely presence of insulin resistance, as observed in our control subjects, may be associated with increased IADL score. Another potential mechanism underlying hyperglycaemia-induced IADL disability may be abnormal muscular performance. In fact, *in vitro* and *in vivo* studies provide evidence that hyperglycaemia can affect contractile function and force generation in muscles [10, 29].

Main limitations of the present study include both limited generalisability and relatively small number of patients evaluated, both mainly dependent on the rigorous patient selection.

In conclusion, the results of our study suggest that hyperglycaemia *per se* may be responsible for IADL disability in diabetes. Therefore, since IADL disability seems to be a reversible phenomenon that could be corrected by an appropriate control of hyperglycaemia, it may be proposed as a short-term clinical end-point of the hypoglycaemic treatment of diabetes and should find a place in the work-up of aged patients with type 2 diabetes. However, also due to the above listed limitations of the study, our results need to be confirmed by future prospective studies which will also clarify the neurobiological mechanisms responsible for hyperglycaemia-induced disability.

Key points

- In aged patients with type 2 diabetes hyperglycaemia may *per se* be responsible for a limitation in 'instrumental' ADL.
- The correction of hyperglycaemia may have a direct impact on such 'instrumental' disability, regardless of the persistence of chronic complications of type 2 diabetes.

Conflict of interest

No conflicts of interest.

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What predicts compliance rates with hip protectors in older hospital in-patients?

SIR—In England, over 200,000 patients fall in hospital each year, of whom over 530 are likely to suffer a hip fracture [1]. Evidence suggests a role for hip protectors in reducing hip fracture rates in institutions, specifically in care homes [2]. There is no evidence on whether hip protectors are effective in reducing hip fracture rates in hospitals.

Compliance problems have been widely reported in the literature, with discomfort frequently identified [3–6]. In care-home studies, where good compliance has been demonstrated, researchers have suggested that key factors include dependence on nursing staff [7] use of a structured teaching programme [8] and staff motivation [9]. Lack of standardisation in measuring compliance has complicated comparison between studies [6]. Compliance rates in care-home studies of 24% [10, 11], 28% [5], 50.3% [12] and 80% [8, 9, 13], have been reported.

Little research on compliance has been carried out in a hospital environment. A recent study by Haines *et al*. [14] reported that approximately half of the patients at high risk of falls wore hip protectors for at least 12 h per day. However they also found that hip protectors reduced patient independence in toilet use.